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BROADCASTING AND COMMUNICATION RECEIVER APPARATUS

## BACKGROUND OF THE INVENTION

The present invention relates to a broadcasting and communication receiver apparatus which receives information about a transmission program  
5 together with video and audio data, decodes and displays the program-associated data and more particularly, to a receiver apparatus which can display program-associated information.

In a prior art television signal receiver  
10 apparatus, program information such as the title, start and end times of a broadcasting program has not been transmitted together with video and/or audio signal and thus it has been impossible to display these information on a television display screen. For this reason, TV  
15 viewers have acquired these information from a program schedule chart run in newspaper.

Further, digital broadcasting has been being started in which digitized signals in place of conventional analog TV signals are transmitted to each  
20 home via satellite, cable or land-based broadcasting. Satellite broadcasting has been already realized in such a manner and, even in Japan, plans have been already in the works for start of such service. In the digital broadcasting, various sorts of additional information  
25 can be transmitted simultaneously with digitized video

and audio signals. When such additional information can be used to prepare a program schedule chart.

Meanwhile, even in the conventional analog broadcasting, when such a system is employed that  
5 program-associated information is multiplexed during vertical blanking interval, a program chart similar to that in the digital broadcasting case can be prepared.

Fig. 1 is a block diagram of a multiplex system of an analog broadcasting type, in which  $S_A$   
10 denotes an audio signal,  $S_V$  a video signal,  $S_P$  program-associated information such as a title, start and end times of a broadcasting program. Reference number 1 denotes a multiplexer for multiplexing the video signal  $S_V$  and the program-associated information  $S_P$ , numeral 2  
15 denotes a modulator for modulating the video signal  $S_V$  and the audio signal  $S_A$  into broadcasting electromagnetic wave.

In the analog broadcasting system, there is employed a method for multiplexing the program-  
20 associated information  $S_P$  during the vertical blanking interval. However, the amount of information capable of multiplexing during the vertical blanking interval is small when compared with the amount of information transmittable in the digital broadcasting system. In  
25 the analog broadcasting system, further, with respect to its screen displaying function, its screen displaying ability as well as the amount of information to be handled are restricted. Therefore, the display screen

implemented based on the analog broadcasting system is inferior in presentation ability to that based on the digital broadcasting system.

Fig. 2 is a block diagram of a multiplex system of a digital broadcasting type, in which reference symbols  $3_A$ ,  $3_B$  and  $3_P$  denote encoders for encoding the audio and video signals and program-associated information respectively. In the digital broadcasting system, the audio signal  $S_A$ , video signal  $S_V$  and program-associated information  $S_P$  are encoded and compressed respectively by the encoders  $3_A$ ,  $3_B$  and  $3_P$ , and then subjected by the multiplexer 1 to a time division multiplexing operation to obtain a multiplexed signal. The multiplexed signal is modulated by the modulator 2 into broadcasting electromagnetic wave.

The digital broadcasting system is featured in that, since the program-associated information  $S_P$  is encoded and compressed by the encoder  $3_P$ , more signals can be multiplexed than the program-associated information multiplexable in the analog broadcasting system.

When it is desired to display such program-associated information as program chart on a predetermined display zone of a display screen, e.g., a television display screen, if a display zone necessary for full display of all the display data is larger than the predetermined display zone, then all the display data cannot be fully displayed on the limited display

zone. For this reason, there disadvantageously occurs such a situation that part of the originally-displayable information is missing.

#### SUMMARY OF THE INVENTION

5           It is therefore a major object of the present invention to display the entire display data on specific information selected by a viewer or to add an information correcting display when the display data is missing to thereby allow the information of the display data to  
10 be presented within a limited display zone of a display screen.

          Another object of the present invention is to eliminate the need for newspapers and magazines carrying program-associated information.

15           In accordance with an aspect of the present invention, there is provided a broadcasting and communication receiver apparatus which comprises a receiver means for receiving at least program-associated information including title, start and end times of a  
20 broadcast program together with a video signal and a audio signal; a decoder means for decoding the program-associated information from the received signal; a screen display means for processing and displaying the decoded program-associated information on a display  
25 screen; a command receiver means for receiving an input signal from a remote controller or from a key or keys provided to a main body of the receiver apparatus; and a

display controller means for controlling the display screen based on the input signal.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the present invention  
5 will now be described in conjunction with the accompanying drawings, in which;

Fig. 1 is a block diagram of a multiplex system of an analog broadcasting type;

Fig. 2 is a block diagram of a multiplex  
10 system of a digital broadcasting type;

Fig. 3 is a block diagram of a broadcasting and communication receiver apparatus in accordance with a first embodiment of the present invention;

Fig. 4 is an example of a display screen for  
15 display of program-associated information for explaining the present invention;

Fig. 5 is a first example of the program-associated information display screen in Fig. 3;

Fig. 6 is a second example of the program-  
20 associated information display screen in Fig. 3;

Fig. 7 is a block diagram of a broadcasting and communication receiver apparatus in accordance with a second embodiment of the present invention;

Fig. 8 is a third example of a display screen  
25 for display of program-associated information in Fig. 7;  
and

Fig. 9 is a fourth example of the program-associated information display screen in Fig. 7.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiments of the present invention will be  
5 explained with reference to the accompanying drawings.

Fig. 3 is a block diagram of a broadcasting and communication receiver apparatus in accordance with an embodiment of the present invention, which includes an input terminal 101 for input of broadcasting and  
10 communication signals from an external antenna or the like, a separator or demultiplexer 102 for extracting any one of video and audio signals and program-associated information signal from the received signal, a A/V decoder 103 for decoding the video and audio  
15 signals to reproduce original image and original audio, an image multiplexer 104 for multiplexing the video signal and such graphics as characters, a television display 105, a command receiver 106 for receiving a user input, an information decoder 107 for decoding the  
20 transmitted program-associated information, a program-associated information buffer 108 for holding therein the decoded program-associated information, a control micro-computer 110 containing the above elements 106 to 109, an input data amount calculator 111 for calculating  
25 the amount of display data received from the information buffer, displayable-data amount calculator 113 for calculating the number of character rows capable of



being displayed on the display screen, a comparator 112  
for comparing the amount of input data with the amount  
of displayable data, a display data setter 114 for  
setting character rows to be displayed, and a display  
5 controller 109 containing the above elements 111 to 114  
for controlling the image multiplexer. Further included  
in the broadcasting and communication receiver apparatus  
are a receiver 118 for receiving broadcasting and  
communication signals and a decoder 119 for decoding the  
10 received signals.

In Fig. 3, a signal applied to the input  
terminal 101 is sent to the demultiplexer 102 through  
the receiver 118 and decoder 119. The demultiplexer 102  
extracts video and audio signals from the received  
15 signal and sends them to the A/V decoder 103.  
Similarly, the demultiplexer 102 also extracts program-  
associated information from the received signal and  
sends it to the information decoder 107 of the control  
micro-computer 110. Program-associated information  
20 decoded by the information decoder 107 is sent to the  
program-associated information buffer 108.

When a signal indicative of a request of  
displaying the program-associated information is input  
to the command receiver 106, the program-associated  
25 information held in the program-associated information  
buffer 108 is sent to the input data amount calculator  
111 of the display controller 109. The comparator 112  
of the display controller 109 compares the number of

character rows calculated by the input data amount calculator 111 with the number of displayable character rows calculated by the displayable-data amount calculator 113, and sends its comparison result and the  
5 input data to the display data setter 114 for setting of the display characters. The display controller 109 controls the image multiplexer 104 in such a manner that the image multiplexer 104 multiplexes the display data received from the display data setter 114 and the video  
10 signal received from the A/V decoder 103 and displays it on the television display 105.

When the number of character rows of the input data is larger than the number of displayable character rows, the display data setter 114 sends as display data  
15 to the image multiplexer 104 the displayable character rows of the input data with a symbol indicative of omission added to the tail of last one of the character rows thereof.

Shown in Fig. 4 is an example of a display  
20 screen for display of program-associated information for explaining the present invention, in which reference numeral 201 denotes a program start time, numeral 202 denotes a program end time, and 203 denotes a program title. In the example of the program-associated  
25 information display screen of Fig. 4, the start and end times 201 and 202 and title 203 of the program are arranged in a row to express its program broadcasting schedule, but a display zone for displaying the program

title 203 is too narrow to display all the program title 203 on the screen until its very end.

In particular, when the system is required to express in Japanese (Kanji), it is necessary to make  
5 large the size of Kanji characters for its expression, which results in that the number of character rows displayable within the display zone is decreased and thus all the display data cannot be fully displayed.

Fig. 5 is a first example of the program-  
10 associated information display screen in Fig. 3. In Fig. 5, numeral 301 denotes an omission symbol indicative of the fact that a tail part of the display data is omitted.

In the case of the program-associated  
15 information display screen of Fig. 4, it is impossible to judge whether the display data such as the program title is fully displayed to its very end or displayable character rows alone of the display data are displayed. In the case of the program-associated information  
20 display screen of Fig. 5, on the other hand, when displayable character rows alone of the display data are displayed, the omission symbol 301 indicative of omission of the tail part of the display data is attached to the last tail of the display character row,  
25 whereby a viewer can clearly know it. Although "..."  
has been employed as the omission symbol in the program-associated information data screen of Fig. 5, another suitable symbol may be used as necessary. Further,

contents to be displayed is not limited to such program-associated information as the program start time 201, program end time 202 and program title 203, but other information may be allowed.

5                    Fig. 6 shows a second example of the program-associated information display screen in Fig. 3, in which numeral 401 denotes a first display zone made up of  $n$  program display areas  $401_1, 401_2, \dots, 401_{n-1}$ , and  $401_n$ , 402 denotes a second display zone, 403 denotes a  
10                    cursor for selecting either one of the  $n$  program display areas  $401_1, 401_2, \dots, 401_{n-1}$  in the first display zone, and 404 denotes a display zone in which a plurality (1, ..., and  $n$ ) of the first display zones 401 are arranged.

15                    Displayed on the first display zone 401 is at least part of display data including program title. Displayed on the second display zone 402 are the same display data including program titles as displayed on the first display zone 401 fully without any omission.  
20                    The cursor 403, in response to a user input signal, selects desired one of the  $n$  program display areas in the first display zone 401. In this way, since the operation of the cursor 403 causes the user to arbitrarily select the specific first display zone 401  
25                    (for example,  $401_1$ ) from the first display zone 401 arranged in the alternative display zone 404, all the display data including program title required by the user can be fully displayed without any omission.

Since only the display data required by the user are displayed without any omission on the second display zone 402 and display data are displayed with an omission symbol on the first display zone 401; more  
5 first display zones can be displayed within the alternative display zone 404.

Turning to Fig. 7, there is shown a block diagram of a broadcasting and communication receiver apparatus in accordance with a second embodiment of the  
10 present invention, which includes a time information discriminator 115 for discriminating time information of input data, a display time band setter 117 for setting a time band of a program chart to be displayed on the display screen, and a time information comparator 116  
15 for comparing the time information of the input data with the time band of the program chart. Other constituent elements are the same as those in Fig. 3.

When a signal indicative of a request of displaying program-associated information on the display  
20 screen is input to the command receiver 106, the program-associated information hold in the program-associated information buffer 108 is sent therefrom to the time information discriminator 115 of the display controller 109. The time information comparator 116 of  
25 the display controller 109 compares the time information discriminated by the time information discriminator 115 with the display time band set by the display time band setter 117, and sends its comparison result and the

input data to the display data setter 114 where their display format is set. The display controller 109 controls the image multiplexer 104 and composes the display data received from the display data setter and  
5 the video signal received from the A/V decoder 103 to display it on the television display 105.

The above program-associated information display screen has such a display format that uses at least character string in each information field and  
10 background, that is, shows such a program chart indicative of program broadcasting schedule that a program start time is given at the left end of each program name field and a program end time is given at the right end of each information field.

15 When the time information of the input data is judged to be out of a display time band range, the display data setter 114 modifies the shape of the left or right end of the display data and sends it to the image multiplexer 104. The display data setter 114  
20 modifies the shape of the left or right end of the program name field to clearly indicate that the start or end time of the program is located out of the time band range of the program chart being displayed.

Fig. 8 shows a third example of the program-  
25 associated information display screen in Fig. 7, which includes a channel number column 501, a time scale column 502, first program name display column 503 indicative of n-channel program display zones 503<sub>1</sub>,

503<sub>2</sub>, ..., 503<sub>n-1</sub> and 503<sub>n</sub>, a second program name display column 504, a continuation display pattern 505 indicative of the fact that a program broadcast start or end time is located out of the program chart being displayed, and a program name alternative column 506 in which a plurality (n=1, ....) of the first program name display columns 503 are arranged.

In the program display screen, abscissa denotes time, a display start position of the first program name display column 503 in the horizontal direction indicates a broadcast start time, and its horizontal length indicates a program broadcast duration. A measure of time is expressed in the time scale column 502.

Further, ordinate indicates broadcast channel. Displayed on the channel number column 501 are channel numbers of broadcasting stations, names or logo marks of the broadcasting stations.

The user operates the cursor 403 using a remote controller or a key or keys provided on the main body of the receiver apparatus to select one of the first program name display columns 503<sub>1</sub>, 503<sub>2</sub>, ... and 503<sub>n</sub> displayed within the program name alternative column 506. The selected first program name display column 503 is also displayed in the second program name display column 504. More specifically, at least part of the program title is displayed on the first program name display column 503, whereas, all the program title is

wholly displayed without any omission on the second program name display column 504.

The broadcast start time, broadcast duration or broadcast end time of a program is expressed based on  
5 a measure of a time displayed in the time scale column 502. However, when the program broadcast duration is longer than a duration expressible on the program chart screen or when the program broadcast start or end time is located out of the time band expressed in the program  
10 chart being displayed, it is impossible to express the program broadcast start or end time within the program chart display screen. For the purpose of expressing that the program broadcasting starts with a time earlier than the time band being displayed or that the program  
15 broadcasting ends in a time later than the time band being displayed; the continuation display pattern 505 is used.

By using the continuation display pattern 505, when the broadcast duration is overlapped as located  
20 ahead or behind the time band being displayed, it is possible to express that the broadcast start or end time is out of the time band being displayed.

Shown in Fig. 9 is a fourth example of the program-associated information display screen in Fig. 7,  
25 which includes a third time information display column 601.

On the program display screen, the third time information display column 601 is provided within the



program-associated information display screen to express therein broadcast start and end times of a program. Therefore, when the program broadcast duration is longer than a duration displayable on the program display  
5 screen so that the program broadcast start or time cannot be expressed within the time scale column 502 of the program chart screen; it is possible to clearly display the broadcast start and end times, i.e., the time information of the received program-associated  
10 information without any omission.

The time information display column 601 may be an independent display zone or may be provided within the second program name display column 504 to be expressed together with the program title.

15 Although explanation has been made in connection with the program display screen based on the digital broadcasting system in the present embodiment, the present invention is not limited to the specific digital broadcasting system but may be applied to such a  
20 broadcasting system that the program-associated information is transmitted as multiplexed to the conventional analog television broadcasting system. Further, the present invention is not restricted to the program chart display screen but may be applied to other general  
25 display one.

In accordance with the present invention, there can be provided, when it is desired to display information associated with an item selected condition,

a program-associated information display screen of a  
broadcasting and communication receiver apparatus, on  
which all display data of the program-associated  
information received by the receiver apparatus are fully  
5 displayed without any omission.

Further, the user can eliminate the need for  
purchasing newspapers or magazines carrying the program-  
associated information.